Mussels: Once an invasive species establishes in a new area, it's nearly impossible to eradicate. p. 16

Nearly 90% of high school seniors lack proficient knowledge of U.S. history. p. 12
Camps, fairs and field days...

...are a key part of the summer traditions of many Montana families. Youth look forward to joining their friends for outdoor activities, campfires and friendly competitions, while unplugging from technology and developing life-long skills through workshops and team challenges. Teens gain valuable leadership skills and volunteers share their talents. Families work together to finish projects from market animals to cooking to gardening, leathercraft and more. Producers attend educational events and field tours to learn and share the latest information from ongoing research.

Everywhere across the state, there are examples of Montana State University engaging with the public through Extension and the Montana Agricultural Experiment Station. It is this direct and regular connection with people in the communities where they live that allows MSU to remain relevant and useful. If you haven’t had the opportunity to visit with your local Extension staff, consider joining an activity near you this summer. For information about what’s available, contact your local Extension office.

To learn more, and to access additional resources, visit msuextension.org.

Sincerely,

Cody Stone is the Executive Director of MSU Extension and has worked in Extension for over 20 years, primarily in leadership and youth development programs.

FEATURED CONTRIBUTOR Mat Walter

After serving three years as the agent in Musselshell and Golden Valley counties where he provided education resources and expertise in agriculture and 4-H youth development, Mat recently relocated to Teton county. There he is the agriculture and natural resources agent and partners with his fellow agent in 4-H and youth development. As a member of the Lives and Landscapes editorial committee, Mat helps in the selection of stories for each issue and is a frequent author, editor and reviewer.
Lives & Landscapes is published quarterly by Montana State University Extension, and content is available online at msuextension.org. To receive a free online subscription, or purchase a print subscription, visit: msuextension.org/magazine.

Have an idea for a story or a question for Ask Steward or our Master Gardeners? Email: ExtensionMagazine@montana.edu or contact the managing editor at 406.994.2502.
Cropland Soil Acidity
An emerging issue in Montana

Farmers in several Montana counties are experiencing crop failure in portions of their fields due to soil acidity (low pH). Traditionally, soil acidity was not an issue in Montana because most soils in agricultural areas were naturally between neutral (pH 7) and slightly alkaline (pH ~8). However, Montana State University soil scientists, Extension agents, crop advisers, and producers have now identified fields in 23 of Montana’s 56 counties with soil pH levels below 5.5, some as low as 3.8. Because pH is on the ‘log’ scale, which increases by a multiple of 10 for each unit, pH levels near 4 are 1,000 times more acidic than pH 7.

The major cause of soil acidification in Montana is the use of ammonium-based fertilizers (e.g. urea and urea ammonium nitrate), especially if applied in excess of plant uptake. Although an excellent fertilizer nitrogen source, when the nitrogen in urea gets converted to nitrate (NO$_3^-$), hydrogen ions are released, lowering soil pH. As soil pH drops below 5.0, naturally-occurring aluminum in the soil is released, reaching levels toxic to plants. Over the past 30 years, Montana has experienced almost a three-fold increase in nitrogen fertilizer application in order to produce the high wheat protein and higher yields that are increasingly possible with improved genetics and management. Perennial crops, such as hay and pasture, are less likely to experience soil acidification because they receive relatively low nitrogen fertilizer rates.

Young plants in acidic areas are often yellow (similar to plants with nitrogen deficiency, yet less uniform) or even purple, with lesions and short, thick internodes. The roots are thickened and brown with a club or “witch’s broom” appearance similar to nematode damage (see photos, page 3). Elevated levels of available aluminum are the cause of these symptoms, leading to reduced yield or complete crop failure.

Soil acidification can change herbicide effectiveness/carry-over, reduce nitrogen fixation by legumes (e.g. alfalfa or peas), and increase some fungal diseases (e.g. Cephalosporium stripe), before symptoms of aluminum toxicity appear. "Unexplained" herbicide damage or poor weed control may be an indication of dropping soil pH. Similarly, nitrogen deficiency in legumes may point to poor nodulation by nitrogen-fixing rhizobia (special bacteria on roots), which prefer pH greater than 6.

Soil acidification in Montana occurs largely in the soil layer where the fertilizer is applied (top 3 inches). The lack of deep tillage and adoption of no-till farming since the 1980s and 1990s can contribute to this concentrated low pH zone near the surface by not mixing surface soil with deeper, higher pH soil. Crop advisers generally sample the top 6 inches and mix 6 to 8 subsamples from a field into a single sample for analysis at a laboratory. Since soil pH can be higher (less acidic) in the 3-to-6 inch depth than in the top 3 inches, the standard 0-to-6 inch soil sample may mask low pH at the surface. Also, pH can vary greatly across fields. The
lowest surface soil pH is often found in low lying or toe-slope areas where pH can be 2 pH units lower than on higher ground less than 100 yards away. Thus, mixing soil samples or cores across multiple landscape positions, which is standard practice to determine an average level of nutrients to establish fertilizer rates, may not be helpful in identifying locations that have soil acidity problems.

Despite the limitation of standard soil samples, farmers are encouraged to look at pH in their 0-to-6 inch soil test reports. If the pH is consistently above 7.5, it’s unlikely the field has a problem. If pH is between 6 and 7.5, additional soil sampling or scouting may be worthwhile if there are poor growth areas showing acidity symptoms. If soil pH is below 6.0, scout for evidence of aluminum toxicity, poor nitrogen fixation, or changes in herbicide action.

To verify that symptoms are caused by low pH, a 0-to-3 inch soil sample can be analyzed for pH in the field or by a lab. Soil at the edge of poor growth areas should also be sampled to determine if the pH there is close to becoming a problem or not. Even if aluminum toxicity symptoms are not found, soil sampling diverse topographic positions in fields is encouraged because areas where pH is less than 6 should be managed differently to prevent further acidification.

The best management approach to slow acidification is to reduce nitrogen-fertilizer inputs and use nitrogen more efficiently. When plants take up nitrate, the major available form of nitrogen in the soil, they release an ion (OH⁻) from their roots that neutralizes acidity. If nitrate is not taken up by plants, or moves below the acidic layer, that nitrate does not contribute to neutralizing the soil layer acidified by urea application. So the more nitrate taken up, especially from the acidic soil layer, the better. Split-applications and variable nitrogen rates increase the proportion of applied nitrogen fertilizer taken up by plants.

Preventing or slowing soil acidification also involves inclusion of legumes and other crops in planting rotations that require less nitrogen fertilization. Perennial forage, such as ryegrass or bromegrass, has been shown to increase soil pH, versus planting continuous spring wheat fertilized at the same nitrogen rate. Keeping plant stubble residue on the field also helps soil resist acidification.

If low pH is already affecting plant growth, producers might want to select species and varieties of common crops that are more adapted to low pH soils. Where low pH is causing crop failure, liming (adding acid-neutralizing material such as limestone) may be necessary, a practice that is common in many other parts of the country.

MSU research has found soil pH in the top 4 inches dropped from pH 7.3 to pH 6.3 in 14 years of continuous-planted wheat receiving nitrogen fertilizer at recommended rates. This demonstrates that even a neutral-to-alkaline soil can become acidified over time by nitrogen fertilization. MSU research also suggests that pH will drop more quickly once it is below about 5.5. Therefore problems can arise quickly. With awareness and early detection, farmers can alter their management to prevent or slow soil acidification, heading off a serious threat to crop production. When the cost of yield losses and liming are considered, the cost of changing nitrogen management or crop rotations may be reasonable.

For additional information on soil acidification and liming go to http://landresources.montana.edu/soilfertility/acidif/index.html or contact Clain Jones (clainj@montana.edu, 406-994-6076). Research funding is provided by Montana’s Fertilizer Check-off Fund and the USDA Western Sustainable Agriculture Research and Education Program.
Canning is an art form, combined with both hands-on experience and a scientific knowledge to create a consumable product. Pickling has grown in popularity in recent years, as have important safety guidelines.

Canning is one of the most recently developed methods of food preservation. It was first discovered in the 1790s. The French confectioner, Nicolas Appert, applied the theory of preserving wine to storing foods in a sealed glass bottle. A pressure retort (canner) was patented in 1851 to can foods at temperatures higher than 212°F. It wasn’t until the 1920s that home canners linked the importance of heat killing the bacteria *Clostridium botulinum*.

*Clostridium botulinum* in canned and pickled foods may cause botulism, a deadly form of food poisoning. Botulinum spores are present on most fresh food surfaces but only produce deadly toxin in the right environment: moist, low-acid food; temperature between 40° and 120°F; and less than two percent oxygen. One small drop of the toxin is deadly and it cannot be seen or tasted. Botulinum can be destroyed by using proper canning techniques and safe storage procedures.

**What’s the difference between pickling and fermenting?**

This can be confusing. Pickling is typically referred to food preserved in an acidic medium. Pickled foods can also be made by fermenting, the process of allowing the food product to cure, generally in a water and salt mixture, over the span of a few weeks at a temperature of 70-75°F, then processing in a boiling water bath or storing in the refrigerator. Fermented foods include kimchi and sauerkraut. There are also recipes called “refrigerator pickles” or “quick pickles” that are not processed in a boiling water bath or fermented, but stored in the refrigerator. Refrigerator or quick pickles cannot be stored safely at room temperature.

**What makes the recipe safe?**

The acidic medium of the pickling recipes and the processing time in a boiling water bath are key aspects to safely preserving pickles and pickled products. Use only vinegar with 5% acidity or greater. Check the acidity level on organic vinegar varieties. White vinegar is preferable for food light in color, such as fruits and cauliflower.

Salt is used in the brine of pickling cucumbers and fermented cucumbers to enhance the flavor and to boost the fermenting process. If a recipes calls for a brine, the cucumbers can be soaked longer to enhance the flavor but it does not reduce the processing time. Use “pickling” or “canning” salt. Other salts contain anti-caking materials and produce a cloudy brine.

Always use a tested recipe from a reliable source and adjust for altitude. MSU Extension can recommend the tested recipes at the National Center for Home Food Preservation and Ball Canning since food scientists have completed rigorous testing on the recipes. Food scientists calculate recipes based on the heat penetration, consistency of the food.
product, initial temperature of food, pH value of the food, water activity, and several other factors. Plus, the adjustment for altitude will be listed with either of these sources. Water does not get as hot at higher altitudes, so the length of processing time must be increased. Processing with heat is a key factor in producing safe pickles since it destroys the yeast, molds and bacteria that may cause the product to spoil.

**What about the spices?**
The spices enhance the flavor of the acidic medium. Some commercial vendors, such as Mrs. Wages or Ball, have pre-packaged pickling spices for ease to the consumer. Many dill recipes call for dill sprigs, garlic, and/or mustard seeds in the jar while some do not. The amount of spice to use is generally whatever the consumer prefers for flavor. Use fresh, whole spices like garlic cloves, dill, pepper, or mustard seeds for the best quality and flavor. Powdered spices may cause the food or brine to be dark or cloudy.

**What makes pickles crunchy?**
An important factor in pickling is the crunch value. There are products to enhance the crispness of cucumbers, but it is important to process immediately after picking. Another trick is to soak the cucumbers in ice water for a couple of hours before processing. Be sure to cut off the blossom end of the cucumber since enzymes may be present there, which can lead to excessive softening of pickles. Allow the pickles about a week to firm up after processing before they are enjoyed.

MSU Extension has a network of Extension agents serving across Montana in each county with various knowledge and expertise. There are also self-help MontGuides, publications developed by faculty members, which focus on home-canning techniques. Hands-on classes are offered across Montana with Family and Consumer Science Extension agents; contact local offices for available food preservation classes or assistance.
Outdoor air quality in Montana

Abundance of wide open spaces, natural landscapes, and low population density are among Montana’s many charms, and these characteristics are often accompanied by notions of clean air and healthy living. However, while Montana is ranked the third-least populated state in the U.S., it surprisingly ranks only fourteenth for healthiest air quality (U.S. EPA). Although we are fortunate enough to have all four seasons, two of our seasons (summer and winter) are often accompanied by poor air quality and are likely the reason why Montana’s air quality is not ranked higher.

Seasonal impacts on air quality

In the spring and fall, Montana’s air lives up to its big sky reputation. Air quality from April through June is very good across the state. Unfortunately, during the dry summer months, wildfires are at their peak in Montana and across the West. Smoke from these fires can travel hundreds or thousands of miles and cause air quality concerns across the state. Tiny particles (particulate matter) and other pollutants are dispersed into the air from wildfire smoke and can penetrate deep into a person’s respiratory system if inhaled. When smoke concentrations are high, effects on the respiratory and circulatory system may become detrimental to our health if exposed for too long. More information about the health impacts from wildfire smoke can be found on the Missoula Climate Website referenced on page 7.

Poor air quality is not just an issue in summer months; wintertime air quality is also an issue in parts of western Montana. In the winter, short days, cold temperatures, and snow can promote the formation of “inversions” in western valleys. Under an inversion, cold air is trapped near the surface, with warm air acting like a cap on top. This air does not mix easily, causing any pollution released near the ground to remain trapped. Certain weather patterns can cause these inversions to last for days, with air pollutants from wood burning stoves, vehicles, and other sources building up over time.

Air quality data and staying informed

In Montana, wildfire smoke in the summer and wood burning stoves in the winter are the main contributors to poor air quality. When wood burns, the primary pollutant of concern is tiny particles, known as Particulate Matter 2.5 (PM2.5), which is particulate matter in the air with a diameter less than 2.5 microns. The Montana Department of Environmental Quality (DEQ) administers a network of air quality monitoring stations across the state and reports the data every hour on the “Today’s Air” website referenced on page 7. The website provides easy-to-understand graphs to let Montanans know when they should take precautions to protect their health.

During wildfire season, daily wildfire smoke forecasts are posted on the Today’s Air website to report on the location of fires impacting the state, the current state of air quality, and a forward-looking forecast outlining when things might improve. These reports are dispersed on DEQ’s social media sites, to local health departments, and to the traditional media.

Symptoms to be aware of

Breathing unhealthy air can lead to many health issues and worsen allergies, asthma, other respiratory and cardiovascular conditions. It is important to be aware of the symptoms and to know how to keep yourself and your loved ones healthy. Symptoms of breathing unhealthy air may include: coughing, trouble breathing, stinging or itchy eyes, scratchy throat, and headache. It is also
staying informed and protecting your health

important to be aware of signs and symptoms of heart attack and stroke. Unhealthy air exposure can even result in lack of energy, changes in appetite, changes in sleep patterns, feelings of hopelessness, irritability, and depression. For more information about the health effects of wildfire smoke, visit the Missoula Climate website.

Keep yourself and loved ones healthy
When outdoor air quality is poor due to smoke, it is recommended to stay indoors as much as possible and to limit outdoor activities. If limiting time outdoors is not possible, try to limit vigorous activities such as running and playing sports. The Outdoor Activity Guide at todaysair.mt.gov outlines what activities should be avoided when air quality reaches certain levels. Wearing a simple dust mask or a bandana over your face will not remove small particles. If outdoor activities are unavoidable, wearing a mask labeled as approved by the National Institute of Occupational Safety and Health (NIOSH), with either “N95” or “P100” printed on it can help reduce exposure, provided it fits correctly. Prior to using a mask, consult with your doctor, as wearing a mask or respirator may make it harder to breathe. Everyone is affected by smoke differently, so always talk to your doctor about your specific symptoms, medication use, or any unique concerns. When staying inside, it is important ensure your indoor air is healthy as well. Here are few ways to keep your indoor air healthy:

- Keep the house tightly closed, keep windows and doors shut.
- Install a filter on your furnace or air conditioner with a small mesh size and run the system on recirculating mode if possible, to avoid bringing in outside air.
- You can also buy free-standing filter systems with HEPA filters for use in bedrooms or other parts of the house where people spend a lot of time. More information on how to select the right filter is available on the Missoula Climate Website.
- Be aware of radon exposure; see the Extension article referenced below for more information on testing and mitigating for radon.

Do your part for air quality
In the winter, there are actions you can take to improve community air quality, such as limiting the use of wood stoves during inversions. Some Montana counties enforce wood stove burn restrictions to protect air quality during these episodes. Follow all outdoor burning restrictions to avoid adding smoke to the air when conditions are poor. In the summer, stay informed about fire restrictions and avoid activities that could ignite a wildfire. Lastly, share your knowledge with friends and neighbors to keep Montana’s air clean.

Additional resources
Today’s Air (current air quality conditions provided by MDEQ) http://todaysair.mt.gov
Missoula Climate Website (Health Impacts from Smoke) https://www.missoulaclimate.org/wildfire-smoke.html
Missoula Climate Website (Air Purifiers) https://www.missoulaclimate.org/hepa-air-filtration.html
Radon in Montana Homes (Lives and Landscapes article) http://msuextension.org/magazine/articles/265
The evolutionary code of living things is designed to adapt when repeatedly attacked. Invertebrate and vertebrate organisms make adapted changes over generations in both physical and molecular ways. Plant organisms are no different. If consistently stressed, they will find ways to adapt in order to survive. Over the last 40 years, the cropping industry has been both audience and participant to the adaptability (in the form of herbicide resistance) of plant species labeled as weeds. In Montana, herbicide resistance to atrazine was first recorded in kochia (*Kochia scoparia*, above) in 1984. Since then, kochia has been found to be resistant to three herbicide groups: ALS inhibitors, which show the most common resistance (sulfonylureas), synthetic auxins (fluroxypyr and dicamba), and EPSP synthase inhibitors (glyphosate). But kochia is only one example of increasing resistance spreading in the state. Wild oats (*Avena fatua*) have earned a name for multiple resistances over the years. As of 2016, the newest herbicide-resistant weed in Montana is downy brome (left), more commonly known as cheatgrass (*Bromus tectorum*). With the discovery of resistant cheatgrass, the number of resistant plant species in Montana has grown to seven.

Even more alarming than seven herbicide-resistant species is that three of them are resistant to different herbicide modes of action. Kochia (*Kochia scoparia*) and wild oat (*Avena fatua*) have both been found to have multiple resistance. Not only are they resistant to multiple herbicide mode of action groups, they are also showing more than one form of resistance to the herbicides. An herbicide’s mode of action is what leads to plant mortality, specifically, the target site in the plant where an herbicide binds to disrupt the plant’s life. Varied modes of action allow us different ways to effectively kill plants.

To better understand herbicide resistance, delve into the science. The most common example is target site resistance. In this instance, plant enzymes change their structure to block binding of the herbicide molecule; when the molecule can’t bind, the plant is not affected by the herbicide. When a plant mutates to create target site resistance, it often becomes resistant to more than one group of herbicides by limiting the function of that target site. This can potentially create cross-resistance, meaning the mutation of the target site will not only limit the interaction of one herbicide, but possibly all of the herbicides within the chemical family.

A second type of resistance is enhanced metabolic resistance. This type functions by quickly breaking down the herbicide molecules before the herbicide can bond to a target site. One way to prevent this type of resistance is to be conscious of timing weed sprays. The larger and older the weed, the better chance it has of metabolizing herbicide molecules, so spraying weeds at a young age can aid in avoiding metabolic resistance. This mechanism allows many crops to be herbicide tolerant.

Another lesser-known herbicide resistance is enhanced compartmentalization, where the herbicide molecules are bound and hidden in the cell where they cannot bind to the target site, essentially being rendered inert and harmless. This type of resistance is difficult to identify.
Plants evolve to withstand tough environmental conditions, diseases, and attacks by animals and insects. These adaptations are passed to offspring and dispersed across the landscape. When applicators apply herbicides to weeds, they create selection pressure (plants that adapt to pressure have the ability to survive and reproduce). A plant’s chance of survival increases with poor application timing or at application rates below the recommended level. These weeds are not necessarily resistant, but chances increase that they develop resistance and pass it on to offspring. Herbicides are formulated in very specific ways. Herbicide labels list a detailed rate of application in ounces or pounds per acre, and a maximum size or stage of plant for the most effective treatment; typically, the smaller plant, the better.

The greatest challenge to managing herbicide-resistant weeds is that actions to control them promote the spread of resistant genotypes. By removing susceptible weeds, the population becomes dominated by the resistant genotype. This is why it is best to first control weeds while populations are small, when the chances of having resistant plants is low. In order to adequately address new, small populations of weeds, employ a range of management tactics. When tactics are combined to manage weeds, it is called Integrated Pest Management (IPM).

With the many modern chemistries available and an increasing list of resistant species, it can become frustrating when herbicides stop working. Therefore, it is now more important than ever to become proactive and understand the limitations of herbicides. The temperature, tank mix, size of the plants, time of day, soil moisture and precipitation all factor into herbicide effectiveness. A limit on any one of those factors can influence the plant’s survival rate, and the more times a plant survives application, the greater the chance resistance will develop. Fewer herbicides are being introduced annually. With fewer new choices, it will become vital to rotate herbicide modes of action in cropping systems. This essentially keeps plants guessing which target site will be attacked next, and drastically narrows the chance they will become resistant.

Herbicide resistance cannot be fixed with the implementation of more herbicides; neither does it represent the end of herbicide usefulness. Awareness and understanding of the limitations of chemical weed control represent a positive step in efforts to continue using herbicides as a form of control. The future of invasive plant management will depend on a willingness to diversify cropping systems and management strategies. This will include new forms of biological and mechanical controls, as well as cultural controls. Modern cropping systems and cash crop alternatives will need to be considered and implemented to create an environment in fields to prevent resistant weeds from growing and thriving.

Resources
PICKLING: it's not just for cucumbers

The tangy taste of pickled vegetables is one of the simplest pleasures, and a perfect complement to any meal. Pickling is the process of preserving or extending the lifespan of garden produce either by anaerobic fermentation or vinegar immersion. Quick pickling (refrigerator pickles) is another option to preserve an abundant harvest without heating up the kitchen using traditional canning methods.

A basic pickling recipe (fermented, immersion or quick) can be successfully applied to a variety of vegetables. Regardless of the preservation method, super-fresh vegetables are the key to successful pickling results. Almost any vegetable can be pickled and can inspire creativity in shape, size and effect. For example, carrots could be peeled and sliced into sticks, or cut into coins. Cherry tomatoes are typically pickled whole. Green beans and asparagus are pickled in spears, but could also be pickled in smaller pieces (after blanching). Cauliflower, onions, peppers, broccoli, celery, zucchini, summer squash, Brussels sprouts, artichoke, baby corn, jicama, mushrooms, sugar peas and green tomatoes are all options for pickling, with the right recipe.

Pickling isn’t just limited to vegetables. Many fruits can be pickled with good results. Pears, peaches, crab apples, figs, watermelon, and cantaloupe are a few fruits that pickle well.

It is recommended to choose fresh, firm, high quality vegetables and fruits for pickling. Discard bruised, moldy or insect-damaged produce. Grow or purchase varieties of produce that are cultivated for pickling. Using varieties designed for pickling will yield a higher quality finished product.

BEETS
Beets are a classic pickling vegetable, and deep-red beets are the most well-known variety. Their color is the result of a pigment called betalain. While betalain makes red (along with golden) cultivars the healthiest choices, it is also responsible for that hearty taste that either excites or repels those considering beets.

Red varieties:
- Red Ace – sweet
- Detroit Dark Red – deep red
- Early Wonder – 3-4 inch globes
- Bull’s Blood – smaller size with subtle stripes
- Ruby Queen – smooth, round shape
- Forono – cylinder-shaped, with sweet taste
- Cylindra – long, tapered, cylinder-shaped, moderate size

Striped varieties:
These varieties have a bright pink to pale red skin, yet the inside is brightly mottled with vivid rings or stripes on white, like a peppermint swirl. They also have a more mellow, and sweeter taste than dark red varieties.
- Chioggia – this variety is also known as Bassano, bulls-eye, or candy stripe

Gold varieties:
Golden beets also contain certain betalains which give them orange to golden hues in limited amounts, which results in a less gritty-textured beet, which may be more palatable to some.
- Boldor – bright golden-yellow color
- Golden – smaller roots than other gold types
- Touchstone Gold – gold flesh with some yellow rings

White varieties:
This is probably the least-known type of beet. White beets have a mild, sweet taste because they lack betalain. They also lack the familiar beet taste and have the highest sugar content. Use only the smallest beets as the larger they grow, the more tough they become.
- Avalanche – large, round, very white roots
- Baby White Albino – very sweet, with lower levels of sucralose
- Blankoma – slightly conical roots
- Detroit White – retains flavor through cooking
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CUCUMBERS
Use small pickling varieties of cucumbers about the size of your thumb. Pickling cucumber varieties include:

- Kirby
- Mini-English
- Bush Pickle
- Diamant
- Fancipak
- Gherkin
- Alibi
- Calypso
- Eureka
- Northern Pickling

Do not try to pickle the big, common varieties used for salads. Larger cucumbers (3-5 inches) may be left whole, sliced into spears or cut crosswise into chunks. Cucumbers growing larger than five inches are best chopped and made into relish or sliced thinly and made into bread and butter pickles. Fresh eating varieties such as “slicing” or burpless” are not suitable for fermented pickles or refrigerator dill pickles. Wax-coated cucumbers bought from the store are also not suitable for pickling because of their variety, and because the pickling solution cannot penetrate the wax coating.

BEANS (AND PEAS)
Both green beans and sugar peas can be pickled with pleasing results. Recommended bean varieties include:

- Blue Lake
- Kentucky Wonder
- Contender
- Derby
- Green Crop
- Harvester

PEPPERS
Any type of pepper can be used to make home-canned, pickled peppers. Thick-fleshed peppers with firm, waxy skins and bright, glossy color, free from defects, give the best pickled products. Avoid peppers that are soft, shriveled or pliable, and dull or faded in color. Common varieties for pickling are:

- Cubanelle
- Hungarian Wax
- Sweet cherry
- Sweet banana
- Sweet bell
- Jalapeño
- Ghost

ASPARAGUS
This long-lived perennial vegetable can produce for 20 – 30 years. All-male asparagus plants (those without small, red berries on the plant in late summer) tend to produce more spears, earlier in the spring. Most varieties lend themselves well to pickling.

- Jersey Supreme
- Jersey Knight
- Apollo
- Ariane
- Mondeo
- Stewarts Purple
- Jersey Giant
- Purple Passion
- Viking
- Millenium
- Pacific Purple
- Heirloom Mary Washington

Vegetables can be pickled either alone or in combination like giardiniera (Italian pickled vegetables). By using safe preservation practices, pickling enthusiasts can reap success as they try different recipes to preserve fruits and vegetables using the pickling process. For trusted, research-based pickling recipes, please visit the National Center for Home Food Preservation website: https://nchfp.uga.edu/how/can6b_pickle.html.
If you didn’t love academic history courses, you may not be alone. Many primary and secondary school students rate history as a least-liked subject and perceive social studies as unimportant, both academically and in their daily lives. With remarkable consistency in 30 years of educational research, history courses are commonly described with dismissive terms.

What could be termed as a lack of enthusiasm for history education has manifested in the average assessment scores of primary and secondary students. According to the National Center for Educational Statistics, only 20 percent of fourth-graders, 17 percent of eighth-graders, and 12 percent of high school seniors performed at or above the proficient level on the 2010 U.S. history assessment. Invert the high school seniors number to see the surprising statistic: 88% of potential new voters are below the proficiency level in knowledge of U.S. history.

While this paints a grim picture, there is good news. It’s not the subject of history that turns kids off, it’s the way it’s taught. Do you recall a school history class with a heavy dose of textbook readings, lecture, and rote memory? These traditional methodologies common to formal history education remain teacher-centered and typically leave students disinterested and detached from the content. Textbook-focused strategies offer a shallow and uninspiring glimpse into the past with little regard for the humanness of the people involved or their challenges.

The key to excitement for history education is active learning. Studies have found that student interest and enjoyment in the classroom can be enhanced with activities like role playing, group discussion, making dioramas, playing games, working on projects or reports, expressing personal opinion, and creating or listening to stories. Allowing youth to pursue topics that interest them personally is just as important. These active learning approaches are often found to be challenging and more personally relevant to students.

The “Learn by Doing” philosophy is a pillar of the 4-H program, with a proven record of educational success dating back to 1902. Experiential educational techniques lend themselves well to projects in animal science, engineering, foods and nutrition, communication, leadership, and citizenship. But history? How can a young learner experience something that happened more than a century ago? Despite the odds, the 4-H Western Heritage Project is demonstrating positive impacts in both experiential history and learner interest.
Experiential History Education

The 4-H Western Heritage Project is a combination of shooting sports and the study of the American frontier from 1860-1900. Members dress in authentic clothing, develop a nineteenth century persona based on historic research, and compete in a target shooting contest using period-correct firearms. At state or national contests, 4-Her’s also take a written exam focusing on the history of the area surrounding the contest site, as well as on safety rules and general project topics. Shooting contributes 50% to their overall score while their persona interview, in front of a panel of judges, and their test score each contribute 25% of their overall score. As often happens, the best marksperson is not guaranteed a championship. Contestants with lower shooting scores have a chance to win if they perform well on their persona interview and written exam. This aspect keeps more members engaged in the project, even if they can’t physically shoot as well as top markspersons.

The 4-H Western Heritage Project began in 2008 in Gallatin County, MT, with six youth from the Bozeman area, and has since expanded to over 1,400 members in a dozen states. Rapid growth and interest drove the creation of a National 4-H Western Heritage Conference and Championship, with the sixth consecutive event scheduled for Winton, CA, in July of 2019. Each national conference includes a competitive event made of all three components of the project: shooting, persona interview, and the written exam.

Additionally, 4-H members and their families participate at the national conference in hands-on workshops, from old-fashioned photography to Native American medicinal plants, and many other frontier-related topics. Project members don’t simply hear about a topic, they participate in it by hewing logs, panning for gold, hitching up a team of horses, making leather goods, cooking trail foods, polishing presentation skills, and even taking apart a pocket watch.

Conference speakers have included Mark Twain (played by a Missouri Extension agent); Zerelda James, the mother of Frank and Jesse James (played by a living historian); Mark Hall-Patton, the Clark County, Nevada, museum administrator and television’s Pawn Star’s “Beard of Knowledge” expert on the History Channel; Andrew Patrick Nelson, PhD, Assistant Professor of Film History and Critical Studies at MSU and commentator on the documentary series “Legends & Lies: The Real West” on Fox News; Quintard Taylor, PhD, a nationally renowned historian on African Americans on the American frontier; and a top-notch cultural education presentation that included the Pikuni Badger 4-H Club, a traditional Blackfeet dance group of 4-H youth from the Blackfeet Reservation in Montana.

Participants are introduced to nationally-known scholars and personalities, and exposed to many careers related to historical study. Many of these potential careers do not fit the stereotypical image of a historian.

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In her youth, 4-H was huge. In her later years... still, 4-H was huge. After more than 50 years associated with 4-H, Betty McCoy was inducted into the National 4-H Hall of Fame in 2018.

Her specialty is in stories – listening to them, sharing her own and other’s, and connecting them to solve problems, build partnerships, and use them as a tool for learning. In 4-H, the experience becomes the story, and McCoy's story is a great one.

"It all started, as for so many kids, when my older sister enrolled. After I became a member, the next 10 years taught me a great deal," said McCoy. "I would come to understand that I didn’t much like junior camp, but junior leader camp was okay; that I learned as much from making a dress that earned a white ribbon at the fair as those that received blue ribbons; that giving demonstrations got easier with practice and time; that I could learn a lot from watching and listening to others – especially my sister and her friends; that I could survive the misery and adventure of culture shock when I was an International 4-H Youth Exchange (IFYE); and that I should be slow to judge and quick to reach out to others. It is easy to talk about what I learned in 4-H, because it is so personal."

"Looking back, what I learned was because of my 4-H leader, who was also my mom, and my Cascade County Extension agents. The influence those people have on kids in 4-H is extraordinary. They provide a family when one is needed, guidance when necessary, correction when required, and explanation when asked. The club was a social outlet and safe practice ground for speaking in front of groups, learning to lead, learning to work with a group and the importance of good communication. It was where I learned to find and trust friends."

Her experience as a member of 4-H shaped her future. She said "Because of 4-H, my career choice was teaching, not in a school but through Extension and 4-H."

For 10 years, McCoy served as a state 4-H specialist (1978-1988) with responsibilities in curriculum development, volunteer management, and volunteer leadership. She became the 4-H Program Leader in 1988. McCoy served as a leader for the Montana 4-H program from 1988 until her retirement in 2004 by providing leadership for staff development for county faculty in the areas of youth development, volunteer management, and youth as resources. She worked to keep the program locally relevant by guiding the
Montana Extension Advisory Council – Youth Subcommittee, the Montana 4-H Leaders’ Council, the Montanans for 4-H Legislative Group, and the Montana 4-H Foundation Board of Directors.

She was also instrumental in guiding the transition from the ‘State 4-H Office’ to the ‘Montana 4-H Center for Youth Development’ through the university approval process and the Board of Regents. The Center was approved in November of 2002.

“With a constant focus on youth, Betty McCoy provided leadership for the Montana 4-H Youth Development program with professionalism and passion. She earned the trust of youth and adults across the state and the admiration of peers across the country through her dedicated service,” said Cody Stone, MSU Extension Director. “The National 4-H Hall of Fame honor is a tribute to a lifetime of engagement and visionary leadership within Montana 4-H.”

“It has been interesting to be a part of the major challenges the program has faced. Introducing the “youth at risk” emphasis into Montana 4-H very nearly maxed out my problem solving, conflict resolution and communication skills. Building on those experiences, solving conflicts between leaders, faculty, and parents was interesting, challenging and in some cases even fun. It was wonderful when a conflict was resolved and all could get back to working with kids. In every situation, staying true to the beliefs, principles and values of the program never failed,” said McCoy.

Not one to seek the spotlight, McCoy lives by a phrase she says often, and it aptly defines her spirit of giving: “How do we lift up others and their work?”

McCoy drew on her institutional knowledge, historical research, and personal memories to write the book “Past, Present, Possibilities: Exploring 100 Years of Montana 4-H 1912-2012” in celebration of Montana’s 4-H centennial. Her primary focus as the author was to collect, share, and honor other’s ownership, experience, and stories of growth through the 4-H program.

Then came the National 4-H Hall of Fame, where her nomination said this: “Betty McCoy is truly an individual who embodies the values celebrated by this award. Her influence and positive impact to the character of the 4-H program nationally has been pervasive and substantial from her early career to her retirement as Montana 4-H Program Leader in 2004. Since her International 4-H Youth Exchange experience as a delegate to Venezuela in 1969-1970, McCoy has been a positive and influential force behind all international programs in Montana 4-H.”

McCoy has a firm belief that the core essence of 4-H is all about experiences and relationships. She buys into the foundation of the 4-H program, and sees that the value of the program in local communities has something to do with its longevity. "Organizations are what they are because they have been built on a foundation of beliefs, values and philosophies," she said.

On a private level, McCoy and her husband Nick Shrauger own and operate the Gooch Hill House Bed and Breakfast in Bozeman, MT. She is also a member of the Montana Ghost Town Society, working to preserve Montana’s history. She has supported the Big Sky Draft Horse Expo for more than 10 years. She has also been a member of the Middle Creek Community Club, where through the club she worked to support the Red Cross, Gallatin Valley Food Bank, and the Humane Society. She’s contributed annually to the Montana 4-H Foundation, and since retiring, McCoy has also joined the County Home Extension Homemakers Club.

4-H is the nation’s largest youth development organization, serving more than 6 million young people across America and 20,000 youth in Montana annually with research-based programs in leadership, citizenship, communication and life skills. The program also offers leadership development for almost 3,000 adult volunteers in Montana. For over 100 years, 4-H has connected the science, engineering and technology innovations of land-grant universities to local youth and families. For more information about 4-H in Montana, visit montana4h.org.
Think about how you use water. Outdoor enthusiasts float downriver, motorboat across lakes and reservoirs, and fish for trout and walleye. Farm and ranch communities irrigate crops and water livestock. Many households rely on water from rivers and lakes for drinking water and hydropower dams to generate electricity. Now think about what you would do if the water you enjoy and rely on was infested with weeds, carried diseases or was covered with invasive mussels. Collectively, these invasive plants, animals and diseases are called Aquatic Invasive Species (AIS), and Montana is determined to protect our precious water resources from their devastating impacts.

When a plant or animal enters a new geographic area outside of its native range, the results can be devastating. With no natural predators, these invaders can rapidly reproduce and overwhelm the plants, animals and fish that normally live in that waterbody. Once an invasive species establishes in a new area, it’s nearly impossible to eradicate.

One of the most devastating AIS is the zebra or quagga mussel. These freshwater mussels, native to the Black and Caspian seas, made their way to the U.S. in the ballast water of cargo ships transporting goods to the Great Lakes. Since that first detection of mussels in the 1980s, mussels have spread overland, hitching rides on trailered watercraft.

Montanans can stop the spread of aquatic invasive species

Zebra and quagga mussels have no natural predators in North America and can multiply rapidly. Each female can spawn 1 million eggs each season. The most alarming feature of these mussels is their ability to attach to any underwater surface using tiny hairs called byssal threads. Imagine millions of thumbnail-size mussels covering hydro-power dams, encrusting the hull and propeller of boats, plugging irrigation and water pipes, and covering docks and shorelines. To make matters worse, the larval stage of mussels is so small you need a microscope to see them, and they can be transported in any standing water.

Mussels are filter feeders, which means they draw in huge amounts of water to filter out plankton as food. This mines the bottom out of the food chain, essentially stealing the food that fish and other water organisms need to survive.

Adult mussels can survive out of water for up to 30 days and like to attach in hidden places found on boat hulls, propellers, or anchors. Mussel larvae can be transported undetected in any standing water, such as bilge and ballast water, and in live wells or bait buckets.

Montana has implemented rules to stop the transport of AIS on watercraft (see side bar.) Montana has been waging a battle against weeds such as spotted knapweed and leafy spurge for many years. But how much do you know about the weeds of the water such as Eurasian watermilfoil, curly leaf pondweed and flowering rush?

These invasive water weeds can take over an area, pushing out native plants, and reduce fish spawning and foraging habitat. In some waterbodies, the weeds are so dense they prevent boating, fishing and swimming.
People can inadvertently transport weeds that get stuck on boat propellers, trailers and fishing gear. Just a fragment of Eurasian watermilfoil dropped into a new waterway can start an invasion. Water gardeners can also introduce invasive weeds by planting non-native species that will spread and overtake an area.

**What You Can Do**

**Boaters:** Whether you have a motorboat, jet ski, drift boat, kayak, or raft, make sure your watercraft is clean, drained and dry before transporting.

**Anglers:** Make sure your fishing nets, lines and gear are clean, drained and dry. Never transport live fish to a new waterbody. Never dump bait fish in the water; dispose unused bait on land in the trash. Wading anglers need to ensure waders and boots are clean and dry. To prevent the spread of tiny AIS, allow waders to completely dry out (use two pairs), put in the freezer overnight, or use chemicals like bleach to clean them.

**Agricultural producers and irrigators:** If purchasing used irrigation pumps, pipe or gear from out of state, have it thoroughly inspected before using. Montanans who work on the land can be the first to notice new infestations. If you suspect something, report it to Montana Fish, Wildlife & Parks.

**Aquarium owners:** If you can no long care for your aquarium pets, try to find another owner, donate them to a pet shop or humane center, or humanely euthanize them. Never dump aquarium animals, plants or water into natural waterways.

**Water gardeners:** Make sure you plant only species native to Montana. Do not plant prohibited species, and whenever possible, use native plants and animals for your pond or garden.

**Hunters:** Clean off plants, animals and mud from waders, hip boots, ATVs, push poles, waterfowl decoys and decoy lines before leaving the water way. Brush hunting dogs and rinse kennels with tap water. When building blinds, use only vegetation found locally and do not transport that material when you leave.

In Montana, we treasure our water resources. It’s up to everyone to help maintain this valuable resource. Whether rowing a boat or pumping water into an irrigation system, practice **Clean, Drain, Dry.** Our economy and the health of our fisheries and water-based infrastructure depends on it. Learn more at [www.CleanDrainDryMT.com](http://www.CleanDrainDryMT.com) or call Montana Fish, Wildlife & Parks at 406-444-2440.

**MONTANA’S AIS RULES**

When transporting watercraft in Montana, you are required to:

- Stop at all open watercraft inspection stations as directed by signs.
- Upon entering the state, all watercraft must be inspected before launching.
- When traveling west over the Continental Divide into the Columbia River Basin, all watercraft must be inspected before launching.
- Inspections are required for all watercraft coming off Tiber and Canyon Ferry reservoirs.
- Ensure that watercraft is clean, drained and dry before transporting.

**Clean. Drain. Dry.**

These are the simple steps everyone can take to stop the spread of AIS.

**Clean.** After recreating or working in a waterbody, completely remove all plants, animals, mud, and standing water from the vessel and equipment. Inspect the boat, trailer, and all gear. Pay close attention to crevices and hidden areas.

**Drain.** Drain or remove water from the boat, bilge, pipes, live wells, engine, internal compartments and bait buckets before leaving the waterbody. Standing water is particularly worrisome because some invasive organisms are microscopic for at least part of their developing lives.

**Dry.** Aquatic invaders can only survive in water and wet areas. Drying watercraft, fishing gear and equipment thoroughly, if given enough time, will kill aquatic invasive species.
Learner Interest

The active teaching methods incorporated in the participatory living history approach of the 4-H Western Heritage Project are vital to the project’s success. In a classroom, the closest teaching methodology to participatory living history is historical drama, and studies indicate positive results in interest and knowledge retention.

Encouraging the development of a historical persona is vitally important in the project. It allows for creativity in who the 4-H member represents and the story surrounding that character. It requires research, results in a role-playing experience, and contains high doses of self-determined interest. Each youth chooses their persona and is free to change their mind when a better idea strikes. As a result, adult project leaders report witnessing a growing sophistication of the persona as the 4-H member matures.

Combining shooting with a persona in period dress, as well as authentic-looking stages and props, brings the past alive. Authenticity in all facets of the program is very important to participant interest and learning. As one youth reported in a research interview regarding authenticity, “I feel like I’m there in the Old West. I’m living it.”

A retrospective pre/post study indicated that youth with at least one year in the 4-H Western Heritage Project reported a much higher level of agreement to statements about learning history compared to their responses before experiencing the project.

The positive change among participants was statistically significant: they saw increased connection between the past and today, found personal importance in history, and could relate to historical roles of women and minority groups. Even youth who were drawn to the 4-H Western Heritage Project because they already had an interest in history moved significantly further up the ‘agreed’ scale.

Can the 4-H experiential learning model be applied to history education? The above results suggest it is not only applicable, but also increases youth interest in a topic which is typically found unappealing and emotionally flat.

Historians often say that history should not be read, but felt. The immersive aspect of the 4-H Western Heritage Project delivers history to a very personal, empathetic, and emotional place seldom reached in lectures and textbooks. The ultimate hope is that 4-H members will pursue their heightened interest as lifelong learners. To find out more about the 4-H Western Heritage Project, as a volunteer or a 4-H member, visit montana4h.org.
With the recent resurgence of interest in producing and purchasing locally-sourced food, Montana’s revised cottage food bill took a big step forward in allowing certain food items to be produced in a home kitchen and sold to the public. The revised cottage food law went into effect in October, 2015, and allows individuals to produce and sell non-potentially-hazardous foods such as baked goods, candy, cereals, granola, nuts and nut mixes, preserves and honey. Cottage food products can only be sold in Montana and must be sold directly to the customer.

Registration with the local Environmental Health Agency is required. There is a one-time application fee of $40. If the location of the operation moves or an operator submits additional recipes and labels, the operator will have to re-register.

During the application process, the operator makes assurances that food items will be produced in a clean kitchen. There are restrictions on using tobacco, eating and drinking during the packaging of cottage foods, as well as the access of household pets during production.

While the cottage food law has cleared a way for home producers of food to sell their products, the application process is very detailed and takes some time to complete. A recipe must be submitted for each product being produced and must clearly identify the ingredients and measurements, as well as the directions.

The operator must submit a copy of all steps not listed in the recipe for processing or packaging, as well as a list of special equipment that will be used such as dehydrators, vacuum sealers, pressure cookers, etc. A description of all types of packaging that will be used and the process of how the product is packaged must also be provided.

A detailed label is required for each product. Along with ingredients of the food product, from highest weight ingredient to lowest weight, the label must also identify common allergens and include a statement that the product was made in a home kitchen.

Completed applications are submitted to the County Sanitarian for approval, and they issue a certificate to the cottage food operator. Those who produce foods that are only sold at a farmer’s market don’t have to register them as a cottage food.

The publication, Montana DPHHS Cottage Food Operation Guidance and Registration is available at https://dphhs.mt.gov/publichealth/FCSS/cottagefood. The helpful, detailed guide is also the location of the application form, and it provides examples of what should be included in the application. Your local Extension agent may also be available to assist with creating a product label and preparing recipes for submission.
Q We had a tree removed from our lawn last year and have noticed a round discoloration in the grass around the stump. What is happening?
- Missoula County

A It’s very likely you have a fairy ring in your lawn. Fairy rings appear as circular rings of either darker green or brownish grass, sometimes with mushroom growth at the edges. This is caused by a fungus that feeds on the decaying organic material in the soil, like your tree stump for example. The damage is cosmetic and will likely disappear naturally on its own. If you want to act, there are a few things you can do to help manage the fairy rings. Consider removing the tree stump to reduce the amount of decaying material available. If that is not feasible, try core aeration to remove thatch that may harbor the fungus, practice proper watering and mowing methods to maintain a healthy lawn and establish a regular fertilization schedule.

Q Why do the apples drop off my apple tree in late August or early September?
- Powell County

A Dropping of fruit can be due to a variety of issues such as drought, insects, and disease and these issues should be thoroughly investigated to determine the cause. Fruit trees naturally drop excess fruit as a self-regulated thinning process to prevent over-cropping. This natural fruit drop typically occurs in early June but can occur later in the growing season should the tree not be able to support all the fruit through to maturity. There are four diseases commonly seen on apple trees in Montana and they are: Fire Blight, Cedar-apple Rust, Powdery Mildew and Apple Scab. The Montguide Important Apple Diseases in Montana and Recommended Varieties for Resistance provides detailed information on these diseases and can be accessed via the Internet at https://store.msuextension.org/Products/Important-Apple-Diseases-in-Montana-and-Recommended-Varieties-for-Resistance__MT200812AG.aspx

Q Do I need to fertilize my lawn? If so, how often and when?
- Pondera County

A Fertilizer may be needed to keep your lawn grass looking green and healthy. General recommendations call for fertilizer to be added three times during the year at Memorial Day, Labor Day and Columbus Day. Standard fertilizer rates are often found on fertilizer bags. If you are using standard rates and your lawn is not thriving, or if you wish to reduce the risk of, or diagnose, a potential nutrient deficiency or toxicity, soil testing will help you determine if your lawn has abnormal levels of nutrients. For more information, visit http://landresources.montana.edu/soilfertility/home-gardening.html. When fertilizing, also be sure to water sufficiently.

Do you have Master Gardener questions? Send them to: extensionmagazine@montana.edu.
I’m thinking about trying some native plants in my home garden. Do you have any advice?

Noelle Orloff,
Land Resources & Environmental Sciences Plant Identification Diagnostician

There are many benefits to growing Montana native plants in our home landscapes. Montana native plants are those that have evolved in Montana and occur naturally here. That means they are adapted to the conditions found in our state. Some native plants are great for “xeric” landscaping where drought-tolerant plants are used, meaning they can help reduce water usage. They can also be good wildlife habitat. Even in our densely populated residential areas, birds, small mammals, and pollinators can benefit from the resources that native plants provide. Growing native plants is also fun and helps us learn about Montana plants and ecosystems. Start incorporating a few native plants in your home landscaping and see where it takes you.

Not every native plant will grow in every area of Montana, and it is important to follow the rule of “right plant, right place” just as with any garden plant. For example, plants of Montana’s dry regions are some of my favorites. I have attempted to grow plants like prickly pear cactus (Opuntia polyacantha) and yucca (Yucca glauca) in my home garden, only to have them slowly decline and die in my relatively “wet” Bozeman garden. Avoid these types of mistakes by matching your plant selections with your site characteristics such as moisture, light availability, and exposure to wind.

Ornamental grasses are gaining popularity in home gardens and there are some native plants that work well for this use. My favorite native plants in my home garden are perennial bunchgrasses. Some of these plants are available at local garden centers and nurseries, such as Idaho fescue (Festuca idahoensis), green needlegrass (Stipa viridula), and little bluestem (Schizachyrium scoparium). These plants have decorative seedheads as the spring and summer progresses and are a nice backdrop to more colorful wildflowers.

If you want to start gardening with native plants, good sources of plant material like seeds and potted plants are available at many nurseries. If you are just starting to grow native plants or are a new gardener, trying a few potted plants might be easiest at first. Native plants that can be relatively easy to grow from seed are Lewis’s blue flax (Linum lewisii), upright prairie coneflower (Ratibida columnifera), and blanketflower (Gaillardia artistata). For many species fall is a great time to plant from seed.

There are some great resources to find more information about this topic. Try visiting with your local Extension office for information specific to your area. Another idea is to get inspiration by visiting native plant gardens in your area. Online resources include the Montana Native Plant Society with detailed information, recommended species lists, and sources of plant material: https://www.mtnativeplants.org/Native%20Plant%20Landscaping/.

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Email us at extensionmagazine@montana.edu.

Find out what's in your fields. Attend a field day near you.

June 27  | NARC  | Havre  | 3:30pm | Dinner included
July 10  | CARC  | Moccasin | 8:30am | Lunch included
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July 18  | NWARC | Creston  | 11:30am | Lunch included
July 23  | Post Farm | Bozeman | 8:00am | Lunch included
July 25  | WARC  | Corvallis | 4:30pm | Dinner included

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